Docket No. 0819-0703

H4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)
Yoshiaki HASEGAWA et al.)
Serial No. 09/993,771)
Filed: November 27, 2001)
For: METHOD FOR MANUFACTURING SEMICONDUCTOR AND METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE)

Art Unit: Unassigned
Examiner: Unassigned

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with The United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on 3/21/02

PRELIMINARY AMENDMENT

Honorable Commissioner of Patents
Washington, D.C. 20231

Sir:

Please preliminarily amend the above identified patent application as follows:

IN THE SPECIFICATION:

Please amend the specification as follows:

On Page 27, First Full Paragraph

Thus, according to the second variation, the etching stop layer **19C** having a super lattice structure is formed under the p-type second cladding layer **20** to be etched, whereby it is possible to control the thickness (remaining thickness) of the p-type first cladding layer **18** with a high precision. As a result, it is possible to obtain a desired thickness, i.e., an optimal value, for the thickness of the p-type first cladding layer **18**. Therefore, the light confinement efficiency in the MQW active layer **15** is significant improved. This is because of the prevention of an etching damage to the MQW active layer **15**.

On Page 30, Fourth Paragraph continuing on Page 31

As illustrated in FIG. **10**, during the etching process on the p-type second cladding layer **20**, which is made of p-type $Al_{0.07}Ga_{0.93}N$, the wavelength of the detected PL light is about 350

nm in terms of the peak wavelength at room temperature. Then, as the etching process proceeds and the etching surface comes closer to the etching stop layer **19A,** which is made of p-type $Al_{0.10}Ga_{0.90}N$, the wavelength of the detected PL wavelength decreases to about 345 nm, which is shorter than that for the p-type second cladding layer **20**. This is greater than the Al composition of Al of the p-type second cladding layer **20**, is described above.

On Page 33, First Full Paragraph

For example, in a case where a 4-crystal x-ray diffraction (XRD) apparatus is used, the diffraction angle (2 θ) from the orientation (0002) plane, which is detected during an eteching process on the p-type second cladding layer **20** made of p-type $Al_{0.07}Ga_{0.93}N$, is about 34.7°. Then, as the etching process proceeds and the etching surface comes closer to the etching stop layer **19A**, which us made of p-type $Al_{0.10}Ga_{0.90}N$, the diffraction angel (2 θ) is detected to be about 34.8°. This is because the Al composition of the etching layer **19A** is greater than the Al composition of Al of the p-type second cladding layer **20**, as described above. Incidentally, the diffraction angle from the (0002) plane of GaN in this case is 34.6°.

On Page 41, Second Full Paragraph

First, as in the first embodiment, a cap layer **41** made of p-type $Al_{0.15}Ga_{0.85}N$ is grown, as illustrated in FIG. **13**, by supplying TMA and TMG as group III materials, an NH_3 gas as a group V material, and a Cp_2Mg gas a p-type dopant, onto the substrate, while setting the temperature inside the reactor to about 1000° C and using hydrogen as a carrier gas.

REMARKS

This preliminary amendment corrects minor typographical errors in the specification. Examination on the merits is respectfully requested.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Please amend the specification as follows:

On Page 27, First Full Paragraph

Thus, according to the second variation, the etching stop layer [**19B**] **19C** having a super lattice structure is formed under the p-type second cladding layer **20** to be etched, whereby it is possible to control the thickness (remaining thickness) of the p-type first cladding layer **18** with a high precision. As a result, it is possible to obtain a desired thickness, i.e., an optimal value, for the thickness of the p-type first cladding layer **18**. Therefore, the light confinement efficiency in the MQW active layer **15** is significant improved. This is because of the prevention of an etching damage to the MQW active layer **15**.

On Page 30, Fourth Paragraph continuing on Page 31

As illustrated in FIG. **10**, during the etching process on the p-type second cladding layer **20**, which is made of p-type $Al_{0.07}Ga_{0.93}N$, the wavelength of the detected PL light is about 350 nm in terms of the peak wavelength at room temperature. Then, as the etching process proceeds and the etching surface comes closer to the etching stop layer **19A**, which is made of p-type $Al_{0.10}Ga_{0.90}N$, the wavelength of the detected PL wavelength decreases to about 345 nm, which is shorter than that for the p-type second cladding layer **20**. This is greater than the Al composition of Al of the p-type second cladding layer [72] 20, is described above.

On Page 33, First Full Paragraph

For example, in a case where a 4-crystal x-ray diffraction (XRD) apparatus is used, the diffraction angle (2 θ) from the orientation (0002) plane, which is detected during an eteching process on the p-type second cladding layer **20** made of p-type $Al_{0.07}Ga_{0.93}N$, is about 34.7°. Then, as the etching process proceeds and the etching surface comes closer to the etching stop layer **19A**, which us made of p-type $Al_{0.10}Ga_{0.90}N$, the diffraction angel (2 θ) is detected to be about 34.8°. This is because the Al composition of the etching layer **19A** is greater than the Al

composition of Al of the p-type second cladding layer [72] 20, as described above. Incidentally, the diffraction angle from the (0002) plane of GaN in this case is 34.6°.

On Page 41, Second Full Paragraph

First, as in the first embodiment, a cap layer **41** made of p-type $Al_{0.15}Ga_{0.85}N$ is grown, as illustrated in FIG. [11] 13, by supplying TMA and TMG as group III materials, an NH_3 gas as a group V material, and a Cp_2Mg gas a p-type dopant, onto the substrate, while setting the temperature inside the reactor to about 1000° C and using hydrogen as a carrier gas.